The urban metabolism of Chicago

Andrew Jacobson
Department of Earth and Planetary Sciences
Northwestern University
Using a novel laser-based measurement system (funded by ISEN), we are measuring the concentration and isotope composition ($\delta^{13}C$) of CO$_2$ in Evanston and the greater Chicagoland area.

- Measuring $\delta^{13}C$ values of CO$_2$ allows us to fingerprint CO$_2$ sources (see figure to right).
- Blue highlights daytime hours with high wind speeds that bring air from high in the atmosphere down to the surface. This air has CO$_2$ concentrations and $\delta^{13}C$ values similar to the global average.
- Red shows night to early morning periods with low wind speeds. Under these conditions, CO$_2$ concentrations increase and $\delta^{13}C$ values decrease due to emissions from methane and gasoline combustion.

- A Keeling plot of the data presented in the diagram to the left.
- The Keeling plot illustrates the relationship between CO$_2$ concentrations, which increase from right to the left, and more negative $\delta^{13}C$ values.
- The plot shows that CO$_2$ concentrations are elevated above the global background and that the CO$_2$ originates from methane and gasoline combustion.